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Mission

The Partnerships for Health Reform (PHR) Project seeks to improve people's health in low- and middle-income countries by supporting health sector reforms that ensure equitable access to efficient, sustainable, quality health care services. In partnership with local stakeholders, PHR promotes an integrated approach to health reform and builds capacity in the following key areas:

- *Better informed and more participatory policy processes in health sector reform;*
- *More equitable and sustainable health financing systems;*
- *Improved incentives within health systems to encourage agents to use and deliver efficient and quality health services; and*
- *Improved organization and management of health care systems and institutions to support specific health sector reforms.*

PHR advances knowledge and methodologies to develop, implement, and monitor health reforms and their impact, and promotes the exchange of information on critical health reform issues.

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1. Introduction

In an effort to make information more readily available to those seeking to increase national immunization program (NIP) coverage worldwide and improve, manage, and deliver immunization services in developing countries, an annotated bibliography was developed. This document is intended as a tool for donor agencies (e.g., USAID, SIDA, JICA, UN agencies), ministers of health and finance in developing countries, public health institutions, universities, as well as the Global Alliance on Vaccines and Immunizations (GAVI). Within the context of immunization financing, this tool identifies literature and web resources on costing, cost-benefit analyses, financing, policy issues, tools, and other related topics. For copies of documents listed, please contact the author or publisher listed in the citation. A contact list of key institutions and individuals working on immunization issues is provided as well.

This document contains the following:

- Background information on immunization financing issues
- Summaries of 58 key articles related to immunization financing
- List of 216 documents primarily from 1995 to the present with key words
- Directory of contacts and websites for additional information

Please forward additional cites on immunization financing not listed in this document to: PHR Resource Center, Abt Associates Inc., 4800 Montgomery Lane, Suite 600, Bethesda, MD 20814 USA, or to <pub_info@PHRproject.com>.

2. Background on Immunization Financing

This chapter is excerpted from the executive summary of Review of Financing of Immunization Programs in Developing Countries, *Partnerships for Health Reform (PHR) Special Initiatives Report 12 (DeRoeck and Levin, 1998).*

The issue of immunization financing in developing and transitional countries has become more critical in recent years as donors have reduced their funding for immunization programs; as other health priorities, such as AIDS, compete for limited health funding; and as countries try to add new, more expensive vaccines such as Hepatitis B and Haemophilus influenzae type B (Hib) into their national immunization programs (often called Expanded Programs on Immunization or EPI). A review of existing literature on immunization financing indicates that little information exists to guide donors, ministries of health and finance, and NIP managers in improving management and efficiency of immunization programs, or to develop more effective strategies for costing and financing of all aspects of immunization or services. What little information exists focuses primarily on vaccines alone.

The major findings of a PHR review in this area follow.

2.1 Costs of Immunizations

The literature review reveals that while a number of studies on the cost of immunization programs in developing countries were conducted in the 1980s, few have been carried out in the 1990s. The cost studies from the 1980s show that costs per fully immunized child vary widely, depending on the delivery strategy used (fixed facilities, mobile services, or mass campaigns), the local costs of personnel, and vaccine procurement and distribution. One generally accepted average cost for fixed facilities is $15 per fully immunized child for the traditional six EPI antigens (BCG [Bacille Calmette-Guerin Vaccine], DTP [diphtheria, tetanus and pertussis], polio, and measles vaccines).

Although it is known that the cost per dose of newer vaccines is significantly higher than those of routine vaccines and present more of a challenge to developing countries in terms of financing, less is known about the additional operating costs (cold chain, storage, additional service delivery costs, social mobilization, etc.) of incorporating these vaccines into immunization programs.

Information on the total recurrent costs of immunization programs (including vaccines, syringes, transport, cold chain maintenance, and social mobilization)—even without personnel costs—is much less available in general than information on vaccine costs. In the PHR survey, nearly one-half of the UNICEF survey respondents (33 countries) were not able to provide this information or obtain it from the government. This information was more available, however, in the Latin American and Caribbean (LAC) region, due to the fact that each country participating in the Pan American Health Organization (PAHO) Revolving Fund must prepare annual action plans showing funding by source and program component.

2.2 Financing of Vaccines and Immunization Programs

More and more countries are financing at least a portion of their vaccine costs and many now have immunization or vaccine line items in their government budgets. In the PHR E-mail survey sample of 78 countries, more than one-third (36 percent) reported that they finance 100 percent of their vaccine supply. As expected, there are large regional variations in the level of self-reliance in vaccine financing—while 18 of the countries surveyed in the LAC region (72 percent) reported that they are self-reliant in vaccine financing, only three countries from the Sub-Saharan Africa sample (11.5 percent) are. Three-quarters of the overall sample of countries reported having a specific immunization program or vaccine budgetary line item.

Few countries reported financing as 100% of their total immunization program costs. Most countries, including better-off countries that pay for all of their vaccine supply, still depend at least to some extent on donor funding for such program support activities as training, disease surveillance, cold chain equipment and maintenance, supervision, and social mobilization. Even a relatively well-off country like Brazil received some funding from donors in 1997 for disease surveillance and training activities. However, at least part of this funding from donors, especially in the wealthier countries, may be associated with the worldwide polio eradication campaign or other international disease control efforts.

A number of countries—especially middle-income countries—are financing the introduction of "new" EPI vaccines, including Hepatitis B. Some countries, including the Pacific Island countries, Cameroon, and Bhutan, are receiving donor financing for new vaccines. There is also anecdotal evidence that some poorer countries that receive donor financing for traditional EPI antigens buy additional vaccines, such as Hepatitis B and yellow fever, with government funds.

Cost recovery for preventive health services in general was reported in only 21 countries in the survey (27 percent) and only 14 countries (18 percent) reported cost recovery specifically for immunization services. Two-thirds of the countries reporting cost recovery for immunization services in the survey are in Sub-Saharan Africa, where the Bamako Initiative is being implemented, while no country in the LAC region reported its use. Fees per immunization card or per shot were the most common methods reported, especially in Africa. The amount of costs recovered were in most cases unknown, but where estimated were generally low (less than 5 percent of total costs).

2.3 The Effects of Health Sector Decentralization on Immunization Financing

Decentralization varies widely from country to country, and the effects on immunization programs differ. Since health reforms are still being implemented, it is difficult to fully assess their effects on the financing of immunization programs.

According to the literature, some negative consequences of the move toward decentralization of health service delivery on immunization programs are occurring as countries put new management systems into place. To reduce these negative effects, some change is necessary to facilitate the functioning of immunization programs under decentralization. Since decentralization is accompanied by reforms that rearrange financial mechanisms, donors must also rearrange their funding mechanisms and behaviors in these countries, for instance, by targeting funding to different levels of the health system, and by involving local governments in determining how to spend donated funds most appropriately.

Private Sector/Non-Governmental Organization Participation in Immunization Service Provision and Financing:

The involvement of non-governmental organizations (NGOs) in the provision of immunizations, although small, is important in many countries, particularly in Sub-Saharan Africa and in Asia. However, the extent to which these NGOs provide additional resources to national immunization programs or are simply extensions of the government programs is not known. The specific composition of their clientele (e.g., urban vs. rural, better off vs. poor) is also not well documented.

The involvement of the private for-profit sector in the provision of immunizations appears to be growing, particularly in urban areas. However, insufficient information is available on the extent of this involvement, the extent to which previously underserved populations are being served by the private sector, and whether this mechanism of distribution is increasing resources available for immunization programs.

Disease Eradication Programs:

The few studies that have examined the impact of the worldwide polio eradication campaign on national immunization programs suggest that there have been both positive and negative effects. For example, people's knowledge of the benefits of immunizations has sometimes increased due to the extensive social mobilization efforts associated with the campaign. On the other hand, the level of resources available for routine immunization programs may have decreased. More research on this issue is required in order to determine the extent of the impact on routine immunization programs and how future disease control programs can benefit and work hand-in-hand with national immunization programs.

2.4 International Mechanisms to Facilitate Vaccine Financing

Three international mechanisms have been developed to assist countries in increasing their financial contribution for vaccines. The oldest, begun in 1979, is PAHO's Revolving Fund, which operates on the concept of a pooled common revolving fund and which is able to secure low vaccine prices through large volume contracts with manufacturers. The Vaccine Independence Initiative (VII), which was established by UNICEF in 1991, sets up an individual revolving fund for each country, which then has access to low-cost, high-quality vaccines through UNICEF's procurement system. Both the PAHO Revolving Fund and the VII allow countries to buy vaccines in local currency and to pay for them only after the vaccine deliveries have been made, thereby eliminating two major obstacles—the lack of hard currency and the need to pay for vaccines in advance—that developing countries often face in purchasing vaccines on the open market. To date, all but four countries in the LAC region participate in the PAHO Revolving Fund, and 20 countries (including 12 Pacific Island countries, but not including countries participating in the VII through the European Union [EU] Initiative) currently have VII contracts. The recently developed EU Initiative, currently being implemented in eight Sahelian African countries, earmarks EU structural adjustment funding for immunization by creating an immunization or vaccine line item in each government budget and provides access to UNICEF's VII.

According to its proponents, the EU Initiative has resulted in vaccine financing being more secure and having a greater priority among governments in some of the world's poorest countries than has been the case in the past. The initiative has, however, been criticized for targeting the countries least able to pay for vaccines, thereby increasing the likelihood of funds being taken away from other critical immunization or health program components. Other problems attributed to the program are

the lack of a mechanism to track governments' share of vaccine financing, and the lack of concrete plans to gradually increase the governments' share of financing over time.

2.5 Information Gaps

The PHR review has found that there is a considerable lack of information on many aspects of immunization costs and financing. The most salient gaps in information include the following:

Costs

- Updated information on the costs of routine immunization programs to follow up on the cost studies conducted in the 1980s;
- Cost savings associated with greater program efficiencies;
- The additional costs of incorporating new vaccines (especially Hepatitis B, Hib, and yellow fever) into national immunization programs and the components of the additional costs of introducing these vaccines;
- Costs associated with new technologies to improve safety injections.

Vaccine and Immunization Financing

- The proportion of total immunization program costs for which governments are actually paying;
- The impact of decreased donor funding for vaccines and immunization programs and corresponding increase of national governments' share of immunization costs on immunization coverage rates and on the overall performance and quality of immunization programs;
- The impact of adding new vaccines on the financing mechanisms and available funding for immunization programs overall (including the effect on funding for other immunization program components and/or health programs);
- The actual prevalence in developing countries of both formal and informal cost recovery for immunization services (including cross-subsidization from fees for other health services) and the actual and potential rates of cost recovery that they are achieving or could achieve;
- Information on who is and is not using immunization services in areas where cost recovery is being implemented, and the impact of cost recovery on the quality and effectiveness of these services;
- Information on whether or not cost recovery can be a valuable means of enhancing the sustainability of immunization programs and under what circumstances, and which specific cost recovery mechanisms have the most potential for mobilizing additional resources without having a negative impact on utilization;

- The prevalence and potential for financing mechanisms other than user fees to pay for the costs of immunization programs, such as prepayment schemes and health insurance schemes.

Effect of Changing Health Sector on Immunization Financing

- The extent to which flows of funds in decentralized health systems are covering immunization program costs previously funded directly by the central ministry of health;

- The extent to which, and how resources have been mobilized at the local level for immunization services in countries with decentralized health systems;

- The extent to which the private sector has become involved in immunization service delivery, especially in countries with decentralized health systems, and the extent to which, if at all, participation of the NGO and for-profit sectors lowers the immunization program costs to the government;

- The impact of increased private sector participation in immunization service delivery on the equity of access to services, on coverage, and on the quality and safety of services;

- The extent to which polio eradication has affected the availability of resources for routine immunization services, and how disease control campaigns can be designed and implemented to benefit routine immunization programs and to minimize any negative effects on the management and financing of routine immunization activities.

International Mechanisms to Facilitate Vaccine Financing

- The impact of increased government share of vaccine financing through the VII, the PAHO Revolving Fund, or the EU Initiative on countries' vaccine supplies;

- The key country or other factors that improve or hinder the success of these vaccine financing mechanisms;

- The impact of these mechanisms on the long-term sustainability of country financing of vaccines and immunization programs, especially given that the VII and EU Initiative were conceived as short-term measures;

- How each of these mechanisms can be improved to minimize vaccine shortages, ensure the long-term sustainability of vaccine and immunization program financing, and ensure that increased government funding of vaccines does not result in inadequate funding of critical immunization program components;

- Other barriers to the long-term sustainability of country financing of immunization programs that these mechanisms are not addressing;

- Information on countries' experiences with direct procurement of vaccines and under what circumstances direct procurement is more beneficial to countries than participation in one of these mechanisms;

- Information on countries' experiences using World Bank or other loans to finance vaccines and national immunization programs, and the impact of these loans on the long-term sustainability of immunization programs;

- Information on whether or not vaccine wastage and other inefficiencies have been reduced as a result of increased government share of vaccine financing;

- Whether there are other potential mechanisms, such as endowments, trusts, and global funds that could be attempted to improve the long-term sustainability of country financing of vaccines and immunization programs.

3. Annotated Citations

Articles are organized by four subject areas and alphabetized by author name and may address multiple issues. Annotations are reproduced from original sources if available; others were written by PHR.

3.1 General Information on Immunization Financing

1. Ainsworth, M. and Batson, A. 1999. "Accelerating an AIDS Vaccine for Developing Countries: Issues and Options for the World Bank."
Keywords: **HIV/AIDS, Vaccine Investment, Vaccine Development**

An HIV vaccine that is effective and affordable in developing countries would improve the prospects for reducing the scope of the epidemic, not just in developing countries but across the world. Both public and private investment for the HIV/AIDS vaccine is currently small and oriented toward the needs of the richest countries. In April 1998, the World Bank set up an institution-wide Task Force to examine ways in which it could help accelerate the development of an AIDS vaccine for developing countries, as one element of its broader program to combat AIDS. The World Bank's objective is not only to ensure that a vaccine is developed, but also to guarantee the broad and early access of developing countries to a vaccine adapted to their needs. This paper reviews that the AIDS Vaccine Task Force has learned to date about the nature of the problem of under-investment in an HIV/AIDS vaccine for developing countries, and summarized some of the approaches under consideration. After discussing the market potential for a vaccine in developing countries, the paper outlines various strategies to increase investment. These strategies include "push" interventions (direct support for research, reducing the costs/risks of clinical trials) and "pull" interventions (expanding lending for existing vaccines, providing better information on developing country markets, market assurances).

2. Batson, A. 1997. "Assuring Affordable Hepatitis B Vaccine for the World." In Rizzetto M. Purcell et al. *Viral Hepatitis and Liver Disease.* **Turin: Edizioni Minerva Medica.**
Keywords: **Hep B, Procurement, Accessibility, Affordability**

Despite the clear health need and benefit, many countries have been unable to provide the hepatitis B vaccine to their populations. For these countries, the limitation has not been the delivery structure—it has been the inability of governments to afford the vaccine because of a combination of price, donor policy, and historical government dependence on donors. Due to the high disease burden of hepatitis B, the existence of an effective vaccine, and the compatibility of delivery with the existing EPI infrastructure, this vaccine has a priority for introduction. All countries could have affordable access to vaccines to protect their children. By using the existing infrastructure more broadly, and by focusing on the priority countries and vaccines, the global community could achieve the maximum health impact with every dollar used. The global community could also ensure a net increase in funds as country budgets in wealthier developing countries expand to take on the responsibility of existing and new vaccines.

3. Batson, A. May 1998. "Win-Win Interactions between the Public and Private Sector." ***Nature Medicine Vaccine Supplement*** **4(5): 487-91.**
Keywords: **Public/Private Sector Partnership, Industry, Pricing**

As both the public and private sectors look with increasing interest at vaccines, they are discovering that their efforts are inextricably linked, with the actions of one having significant impact on the risks, costs, and goals of the other. Rather than an adversarial relationship, the players are finding, somewhat to their surprise, that open dialogue and tailored strategies can be mutually advantageous. Global availability of an affordable product and adequate financial returns can be achieved simultaneously. This can only occur if the sectors work together to ensure tiered pricing, timely investment in global capacity, and targeted procurement strategies.

4. Children's Vaccine Initiative. 1999. "Sustainable Financing for Vaccine Programmes." Background paper for the meeting at Labouisse Hall, UNICEF House, New York, 4-5 February 1999, meeting report and associated document "A Framework for Immunization Financing."
Keywords**: New Vaccines, Financing, Economic Evaluation**

Because of the complexity surrounding immunization financing, it is crucial to develop financing strategies which address the needs of all aspects of immunization programs. At the CVI Meeting on Sustainable Financing for Vaccination Programmes, a framework was constructed which examines variables in immunization financing. This framework takes into consideration various needs, country types, possible economic and financing interventions, as well as players in immunization programs. It should serve as a tool that can highlight and make more explicit certain aspects of the complex financing issue to enable effective action.

5. Clemens, J., Brenner, R., Rao, M., Tafari, N., and Lowe, C. 1996. "Evaluating New Vaccines for Developing Countries. Efficacy or Effectiveness?" ***Journal of the American Medical Association,*** **275(5): 1639-1645.**
Keywords**: New Vaccines, Evaluation**

Despite the profusion of promising new vaccines against illnesses prevalent in developing countries, uncertainties about the balance between costs and benefits of new vaccines have retarded their use in public health practice. Conventional prelicensure trials of vaccine protection exacerbate these uncertainties by focusing on measurement of vaccine efficacy—the performance of a vaccine under idealized conditions. Vaccine effectiveness trials provide a more pragmatic perspective by addressing the performance of a vaccine under the ordinary conditions of a public health program, by capturing direct as well as indirect effects of vaccination, and by comprehensively addressing outcomes of public health concern. The use of effectiveness trials should enable more rational triaging of new vaccines into public health practice by resolving speculative debates about practical costs and benefits.

6. DeRoeck, Denise and Levin, A. 1998. ***Review of Immunization Programs in Developing and Transitional Countries*****. Special Initiatives Report 12. Bethesda, MD: Partnerships for Health Reform Project, Abt Associates Inc.**
Keywords: **Costs, Financing**

This paper presents a review of selected issues related to immunization financing in developing and transitional countries. Information for this review was obtained through an extensive literature search and through an e-mail survey sent to all United Nations Children's Fund (UNICEF) and Pan American Health Organization (PAHO) country offices. Information is presented in four main areas: (1) the costs of immunization programs, with a focus on the costs of introducing additional vaccines; (2) financing of immunization services, including trends in government vs. donor funding, financing of new vaccines, and

the use of cost recovery for immunization services; (3) the effects of a changing health sector on immunization financing, including the impact of decentralization, the role of the private sector in providing immunization, and the impact of disease eradication programs; and (4) country experiences with international mechanisms to facilitate vaccine financing, such as the Vaccine Independence Initiative, the PAHO Revolving Fund, and the European Union Initiative. In addition to summarizing existing information and lessons learned on the financing and costs of country-level immunization programs, this paper identifies critical gaps in information on immunization financing. Further information will be obtained through a series of country case studies on immunization financing that the Partnerships for Health Reform Project is conducting in collaboration with the World Health Organization and PAHO.

7. Dietz, V. and Cutts, F. 1997. "The Use of Mass Campaigns in the Expanded Program on Immunization: A Review of Reported Advantages and Disadvantages." ***International Journal of Health Services*** **27(4): 767-790.**
Keywords**: Mass Immunization Campaigns, Planning**

The use of mass immunization campaigns (MICs) has been and remains controversial. To evaluate these campaigns, the authors review the literature relating to their effectiveness, sustainability, and cost-effectiveness in controlling diseases and raising immunization coverage levels, and their impact on the subsequent development of routine immunization services. Well-conducted campaigns have increased vaccine coverage levels and decreased disease morbidity and mortality. However, unless infrastructure is improved or campaigns are repeated, gains in coverage levels may not be sustained. Studies suggest that MICs are often not as cost-effective for raising coverage as the delivery of vaccines through routine services, but the use of coverage as the only outcome measure is questionable. Mass immunization campaigns can increase awareness of vaccine and may be appropriate in situations where new programs are to be initiated. Little information is available on whether MICs strengthen or interfere with the development of routine services. To be successful, MICs require a well-coordinated and planned effort on the part of national authorities with the identification of specific goals, intensive social promotion, and strong management.

8. Drummond, M.F., O'Brien, B., Stoddart, G., and Torrance, G.W. 1997. ***Methods for the Economic Evaluation of Health Care Programs.*** **Second edition. Oxford Medical Publications.**
Keywords**: Cost-Benefit, Economic Evaluation**

This book provides the reader with a well-equipped methodological tool kit so that the reader is prepared to tackle aspects of economic evaluation methodology including cost-minimization analysis, cost-effectiveness analysis, cost-benefit analysis and cost-utility analysis. This is accomplished by including discussions of specific case studies of particular health financing policies such as hypertension screening programs, clear illustrations, and a number of simple exercises. Costs and consequences of financing policies discussed include therapeutic effect of interventions, impact on future health costs and impacts on other health service usage in the future.

9. England, S. March 1999. "Options for a Global Fund for New Vaccines." Geneva: World Health Organization.
Keywords**: Financing, New Vaccines, Accessibility**

A Global Fund for New Vaccines is being put forward as one possible part of a system for expanding and improving vaccination. In this paper, five parameters of such a fund are explored: equity, impact, feasibility, sustainability, and scope. For each, goals such as access, effectiveness, and independence are discussed. This paper includes an analysis of which other goals are compatible and which would involve trade-offs. The goal of coverage is not always consistent with the goal of equity. Goals of efficiency,

feasibility, sustainability, and focus/simplicity may involve trade-offs with equity. However equity is consistent with efficiency when the practice of efficiency greatly reduces or eliminates the need for rationing of resources. Arguments for greater access include equity, solidarity and social justice. Arguments against access include feasibility and efficiency.

10. European Commission. 1995. "Vaccins et maladies virales: plan directeur, 1er rapport." Bruxelles.

European Commission. 1995. "Task force on vaccine and viral diseases, first report." Brussels.
Keywords: **Industry Market, Research**

The mobilization and coordination of research activities on vaccines and viral diseases is one of the eight areas identified by the European Commission in pursuing its regional development efforts among member countries. The report focuses on improved knowledge of viral infections, general infectious diseases, as well as general financing issues. This report also presents the guidelines of the program in describing the status of the European and global vaccine market, and identifying the needs and priorities for future research.

11. Evans, D.B. and Guyatt, H.L. 1997. "Human Behaviour, Cost-Effectiveness Analysis and Research and Development Priorities: The Case of a Schistosomiasis Vaccine." *Tropical Medicine and International Health* 2(11): A47-A54.
***Keywords*: Cost-Effectiveness, Culture and Behavior**

Immunization costs and efficacy depends on a number of cultural and behavioural factors which are largely ignored in cost-effectiveness studies and these are discussed in this article. Cost-effectiveness analysis has been widely used in the health sector to guide decisions about where scarce resources aimed at disease prevention or control should be funded. In addition, the validity of the behavioural assumptions underlying the economic analysis is rarely considered explicitly. This paper explores the use of cost-effectiveness analysis to set priorities for research using the development of a schistosomiasis vaccine as an example. It then explicitly considers behavioural factors which might affect the accuracy of the calculations. A 'product profile' for the new technology is derived which can be used by developers as a target to aim at. To ensure that the vaccine would be more cost-effective than the currently preferred option for the control of schistosomiasis, chemotherapy based on praziquantel, researchers need a vaccine which has sufficient duration of protection to be delivered as part of the regular childhood immunization programme.

12. Feilden, R. and Nielsen, O.F. April 1998. "Immunization and Health Reform: Making Reforms Work for Immunization." Geneva: World Health Organization.
Keywords: **Decentralization, Country Experience, Service Delivery**

This document has been prepared to provide some insights into how quality immunization services can be sustained in a reformed and decentralized health system, especially if integration disbands the vertical EPI program. This document presents two case studies of countries which have approached reforms in very different ways, and highlights the lessons learned. It is likely that the old systems used for vertical program must be changed to fit the reformed structures and processes; appropriate solutions will be specific to a particular setting. Reforms are likely to involve operational changes in the way that immunization services are to be managed. Integration of services is often perceived to provide a more cost-effective approach than the vertical programs. Monitoring and reviews provide ways of assessing the execution of essential functions at the national level and management of immunization services through all levels of the system.

13. Freeman, P. March 1999. "The PAHO Revolving Fund: History Operations and Contributions to Speeding Vaccine Introductions." An Information Paper for the Children's Vaccine Initiative.
***Keywords:* Management, Financing, Procurement**

This paper describes the strategy of the Americas region for improving immunization programs and for the introduction of new vaccines, emphasizing how the Revolving Fund is employed towards those ends. When established, the Fund's objectives were limited to more traditional procurement and financing tasks. The Revolving Fund is one component of the overall strategy of procurement to sustain immunization financing activities. Many outside the Americas region have not realized the explicit management of this mechanism by PAHO to accelerate systematic uptake of vaccines; when and where cost effectiveness can be demonstrated. This paper describes the history, operations, and strategy of the Fund. Evaluation of program effects from the perspective of the countries served exceeds the scope of this presentation.

14. Jefferson, T. and Demicheli, V. 1994. "Is Vaccination Against Hepatitis B Efficient? A Review of World Literature." *Health Economics* 3: 25-37.
***Keywords*: Hep B, Literature Review, Economic Evaluation**

This study aims to assess the variability of assumptions which economic models for the introduction of vaccination against Hepatitis B are based, the conclusions reached define a minimum set of methodological standards upon which future economic studies on vaccines should be based. One hundred and sixteen published and unpublished works were gathered through Medline literature searches, consulting private databases, and corresponding with all authors and researchers active in economic evaluation of vaccines were identified. All works were assessed but only those which were original economic analyses were included (90 studies). Principle epidemiological and economic variables were extracted and compared where possible. Rough manipulations were carried out to make the data comparable. Profound variability on the main parameters of the efficiency equation were found. Inconsistencies in definition and study design in 38% of a subset of studies was also found. Although a scarce decision-making impact was detected, that may have been due to uncertain or unclear methodology, as few studies reach valid conclusions. In the future, decisions may be based on biased evidence and scarce resources committed to untested programs. There is an urgent need to standardize study methods and define a common set of procedures.

15. Kaddar, M., Guerin, N., and de Champeaux, A. 1992. "Le Marché du Vaccin et l'Avenir des Programmes de Vaccination en Afrique." Séminaire-atelier. 8-10 Décembre 1992, Centre International de l'Enfance, Paris.

Kaddar, M., Guerin, N., and de Champeaux, A. 1992. "The Vaccine Market and the Future of Vaccination Programs in Africa." Seminar Proceedings. December 8-10, 1992, International Children's Center, Paris.
***Keywords*: EPI, Market Segmentation, Industry, Accessibility**

Although accounting for less than 2% of the world pharmaceutical market, the vaccine market has been evolving since 1990. International experts, national EPI managers and vaccine producers participated in a conference on the vaccination programs in Africa (organized by the International Children's Center); underlined the need to improve the sustainability of the Expanded Program of Immunization (EPI) activities and emphasized the necessary but complex analysis of vaccine needs (including stock inventory and the cost of stock losses). The world market is segmented by type of country (industrialized and developing) and by type of product (basic, inexpensive vaccines and new costly vaccines). The level of access to vaccines is strongly determined by economic and financial considerations. This document explains the implications of access for developing countries.

16. Kaddar, M., Guerin, N. et al. 1998. "Training Manual Vaccines: Financing and Management." Paris: International Center for Children and the Family.
***Keywords*: Management, Procurement, and Financing**

This training manual aims to strengthen the capabilities of immunization program leaders to negotiate and organize the central procurement, optimal management and distribution of vaccines at intermediary and peripheral levels. It is split into four parts. Part one, entitled *Vaccine Economics*, works to enable participants to understand the specific economic features of vaccine as a "product" and to understand the characteristics of the vaccine market, and its recent evolution. Part two, named *Supply Factors*, strives to help participants understand the characteristics of world supply and demand for vaccines and to identify supply factors, and sources and methods of financing. *Procurement*, the third part, is intended to facilitate and improve the effectiveness of procurement. This section aims to do enable participants to do the following: estimate their needs as a function of different strategies; identify procurement opportunities on the international market; and facilitate steps to seek out, select, and negotiate with suppliers. The fourth and final part, entitled *Distribution* is designed to enable participants to make management methods and distribution systems more efficient in order to lower costs.

17. Kaddar, M. and de Champeaux, A. 1994. "Comparabilité et utilité des analyses du coût et de l'efficience des programmes élargis de vaccination en Afrique," *Journal d'Economie Medicale* 12(4): 227-238.

Kaddar, M. and de Champeaux, A. 1994. "Comparability and Utility of Cost and Efficiency Analyses of Expanded Programmes of Immunization in Africa." *Journal d'Economie Medicale* 12(4):227-238.
***Keywords*: Costs, Financing**

In the 1980s, the Expanded Program of Immunization (EPI) in Africa received the top priority in the policies of health and resource allocation from international organizations. In the early 1990s, African EPI programs have shown signs of deterioration. Many questions have arisen about the sustainability of these programs because of such factors as: increasing prices of vaccines on the international market, financing of the programs, sustaining technical assistance, etc. This article discusses the range of costs and financing options for EPI programs based on the experiences of French-speaking Africa. It concludes that for maximum program efficiency it is important to better integrate EPI programs into the local context.

18. Kaddar, Miloud et al. 1999. *Case Study of Costs and Financing of Immunization Services in Morocco.* Special Initiatives Report 18. Bethesda, MD: Partnerships for Health Reform Project, Abt Associates Inc.
***Keywords*: Financing, Planning**

The objectives of the study are to estimate the current and future costs of the country's immunization program, to assist the ministry with program planning, to provide recommendations to the Moroccan government on ways to improve its financing strategies, and to draw lessons learned from Morocco's immunization financing strategies for the international health community at large. Financing strategies for immunization have become increasingly important due to Morocco's heavy reliance on external funding through donors such as the World Bank, and the analysis and recommendations in this study are presented in the context of prospects for financial sustainability. Costs and financing data used in the analysis were obtained through government documents and through government and private sector interviews. The financial analysis is based on estimated costs rather than expenditures recorded to provide a more inclusive accounting of costs. The analysis also provides estimates for projected expenditures for the next five years. The report concludes with a set of options in the areas of program planning, management,

evaluation, research, vaccine procurement and supply, and financing structures to improve the financial sustainability of Morocco's immunization program within health system reforms and global changes.

19. Madrid, Y. 1998. "The Introduction and Use of New Vaccines in the Public and Private Sectors. Country Report: Thailand." 27 July draft. Geneva: World Health Organization.
Keywords: **Private/Public Sector Partnership, Hep B, Affordability**

This study examines the factors which influence the early uptake of new vaccines in developing countries with a focus on the role that the private sector may have on public sector decisions to incorporate these vaccines into national immunization programs. The study examines the past experiences concerning hepatitis B (HBV) and Haemophilus influenzae type b vaccine adoption in developing countries. Thailand is one of three countries in which a pilot study was conducted (the other two are Morocco and Zimbabwe). Despite its importance, the private sector has not been a direct driver of new vaccine integration in the public sector although it has been supportive of such efforts. The integration of HBV in Thailand's EPI program can be said to have been driven by a combination of the development of a perceived need and political will. In what regards the establishment of need for an HBV vaccine, the academic community had a key role. Thailand's experience highlights that the affordability of new vaccines is an issue which results in delays in the public sector integration even for a developing country with a relatively high GDP per capita, good economic prospects, a strong public immunization program, knowledge of disease burden, and adequate political will.

20. Mahoney, R.T. and Maynard, J.E. 1999. "The Introduction of New Vaccines into Developing Countries." *Vaccine* 17(7-8): 646-52.
Keywords: **Financing, Procurement, New Vaccines**

The development and introduction of new vaccines is a costly and time-consuming process. Unfortunately, those most in need—individuals in developing countries—are the last to receive these powerful disease-preventing products. From the time a vaccine is first licensed in a developed country to the time most of the poor in developing countries have access to the vaccine can be twenty to thirty years. This delay is unacceptable. There is a great need to reduce this time span. This paper examines five ways of reducing the time span: establishment and dissemination of disease burden data and of cost effectiveness computations; vaccine introduction trials and effectiveness evaluations; establishment of an international consensus on recommendations for vaccine use; assurance of adequate and competitive vaccine supply; and creation of funding mechanisms to supply vaccine to countries unable to finance their own procurement. Each of the five is essential and achieving success on all five will require a heightened level of international effort and coordination.

21. Mahoney, Richard T., Ramachandran, S., and Xu, Zhi-Yi. 1999. "Financing of New Vaccines for Developing Countries." Draft. Seoul, Korea: International Vaccine Institute.
Keywords**: New Vaccines, Financing**

The development of new vaccines for important childhood diseases presents an unparalleled opportunity for disease control but also a significant problem for developing countries: how to pay for them. All children no matter where they live and no matter rich or poor should have access to vaccines to prevent needless illness and death. To address this problem, the international community should establish a Global Fund for Vaccines (Global Fund). Allocation of Global Fund to individual countries would be guided in part by a Vaccine Procurement Baseline (VPB) of 0.01 percent of gross national product (GNP) as an appropriate amount each developing country should devote to its own vaccine procurement. When this amount is not sufficient to procure the vaccines needed by a developing country, the Global Fund would meet the shortfall. The amount required of donors to maintain the Global Fund would be about $430 million per year for both existing EPI vaccines as well as five new vaccines costing $0.50 per dose

and requiring three doses per child. Including program costs, poor developing countries currently spent about 0.13 percent of GNP on EPI immunizations. The addition of five new vaccines could increase this to about 0.20 percent of GNP. In contrast, the United States, as one example donor country, spends about 0.035 to 0.07 percent of GNP for childhood immunization including several new vaccines.

22. Margolis, H.S., Coleman, P.J., Brown, R.E., Mast, E.E., Sheingold, S.H., Arevalo, J.A. 1995. "Prevention of Hepatitis B virus Transmission by Immunization. An economic analysis of current recommendations." ***Journal of the American Medical Association*** **274(15).**
***Keywords*: Hep B, Evaluation, Developed Countries**

This study's objective was to evaluate the outcome of immunization strategies to prevent hepatitis B virus transmission. A decision model was used to determine the incremental effects of the following hepatitis B immunization strategies in a birth cohort receiving immunization services in the public sector: (1) prevention of perinatal HBV infection, (2) routine infant vaccination, or (3) routine adolescent vaccination. The study found that prevention of perinatal infection and routine infant vaccination would lower the 4.8% lifetime risk of HBV infection by at least 68% compared with a 45% reduction for adolescent vaccination. From a societal perspective, each strategy was found to be cost saving, but was not cost saving with respect to direct medical costs. The estimated cost per year of life saved was $164 to prevent perinatal HBV infection, $1522 for infant vaccination, and $3730 for adolescent vaccination. The study concluded that routine vaccination of infants in successive birth cohorts to prevent HBV transmission is cost-effective over a wide range of assumptions. While economically less attractive than infant vaccination, adolescent vaccination protects those children who were not vaccinated as infants.

23. Mercer Management Consulting. February 1997. "Economic Framework for Global Vaccine Supply: Optimal Methods to Meet Global Demand." Report for Children's Vaccine Initiative.
***Keywords*: Costs, Market, Industry**

This document is a presentation from the meeting on 'The Global Supply of New Vaccines' and provides a synthesis of the Children's Vaccine Initiative's work on the vaccine industry and the economics of the vaccine supply. Included are numerous graphics designed to highlight the major elements in their analysis. A summary of findings is as follows: First, volume effects dominate the cost behavior of the vaccine industry. Scale and utilization drive fixed cost per dose, learning drives batch yields, and marginal volume has significant value. Second, revenue effects (pricing) are critical to the industry's profitability. Market mix is characterized by low volumes at high prices and high volumes at low prices. If forced to choose, a commercial supplier will opt for low volumes at high prices. However, this choice is not optimal for either public or private customers because for commercial suppliers it reduces available volume and increases costs and for customers it limits availability. The most profitable route for a supplier is to maximize volume, serving all segments of demand at appropriate price points.

24. Milstien, J. 1999. "Local Vaccine Production: Issues of Quality and Viability." Geneva: Children's Vaccine Initiative.
Keywords: **Vaccine Supply, Cost, Local Production**

A large proportion (measured in terms of doses) of the traditional vaccines used in the national immunization programmes of developing countries are produced domestically (local production). In 1992, as part of the activities of the Task Force on Situation Analysis of the Children's Vaccine Initiative (CVI), World Health Organization (WHO) staff began a study of the characteristics of local vaccine production in developing countries under the auspices of CVI. Since that time, CVI has carried out thirteen full-scale vaccine supply assessments and over thirty smaller assessments in developing nations around the world. The survey revealed numerous problems with the quality, cost, and reliability of the vaccines produced by these manufacturers as well as the manufacturers' inability to effectively manage

epidemiological, organizational, and technological changes. The survey also pointed to a set of factors that appear to be necessary for long term viability. These factors should enable governments and donors to maximise the returns of their technological and financial support by focusing it on the producers that are most likely to be successful. As the study demonstrates, local production is a viable option only for meeting a developing country's vaccine needs when it is well supported both politically and financially. However, the potential disadvantages of relying on local manufacturers are significant, and must be carefully understood and addressed in order to ensure a reliable stream of high quality vaccines.

25. Mumford, E.A., Dayaratna, V., Winfrey, W., Sine J et al. 1998. "Reproductive Health Costs Literature Review." Working Paper Series No. 3. Washington, DC: POLICY Project, The Futures Group International.
Keywords: **Cost-Effectiveness, Costs, Literature Review**

After the International Conference on Population and Development held in Cairo in 1994, reproductive health and the preventive and curative services that could assure it in developing countries became a key objective by more than 180 signatory governments, however it was left unclear what the cost of this expansion was and how it would be financed. To fill that cost-estimation gap, the authors reviewed 160 publications issued between 1970 and June 1997, most of them about the time of the Cairo conference. The studies highlighted in this paper offer some quantitative data on the costs of reproductive health services identified as part of the Cairo agenda. In this review, cost data are reported for eight categories of reproductive health interventions: family planning, safe motherhood programs, maternal/infant nutrition and immunizations, obstetric care, abortion/postabortion care, STIs/HIV/AIDS, reproductive cancers, and miscellaneous gynecology. The review of family planning cost data is treated differently from other reproductive health interventions. For the seven non-family-planning reproductive health elements, there were about 75 examples (29 studies) of unit cost data. We found only 17 instances of cost effectiveness estimates (i.e., quantitative relations established between costs and health outcomes) in 15 studies. Furthermore, there were only six studies that referred to interdisease measures of health outcomes, such as disability-adjusted life years, producing 16 cost-effectiveness estimates. This review recommends that "filling the gaps" should be based on local information needs, and that issues of quality, access, and integrated service delivery require closer attention. In addition, the ongoing debate about existing measure of health outcomes suggests that alternative methods for comparing health interventions merit attention. Finally, collecting the cost information available in developing countries would be useful both to local decision makers and others involved in setting priorities and allocating resources for health services.

26. Resources for Child Health (REACH) Project. 1979-1987. "The Costs of EPI: A Review of Cost and Cost-Effectiveness Studies." Arlington, VA: John Snow, Inc.
Keywords: **Costs, Evaluation, Sustainability**

This document reviews approximately thirty cost and cost-effectiveness studies of the EPI as part of the Immunization Sustainability Study (ISS) undertaken by the REACH Project for the Program and Policy Coordination Bureau of USAID. The objectives of this review are to assess the quality and consistency of cost and effectiveness data of the EPI and to determine whether these data provide a basis for understanding the relationships between program costs and coverage levels.

27. REACH Project. September 1990. "The Costs of EPI: Lessons Learned from Cost and Cost-Effectiveness Studies of Immunization Programs." Revised. Arlington, VA: John Snow, Inc.
Keywords: **EPI, Costs, Cost-Effectiveness**

This document discusses what has been learned from a decade of EPI cost studies. In a time when dwindling resources require that national programs yield greater coverage levels at less cost, cost-effectiveness analysis is an important tool to assist in decision-making about how to allocate scarce

resources. However, some confusion remains concerning the underlying assumptions of cost analysis and the benefits of these studies for program planning and management. This document was written to shed light on what is known about the cost of EPI as well as to clarify some of the strengths and weaknesses of the methods in use. Section one outlines current knowledge about the costs of national child immunization programs. Section two provides information about how to conduct a cost-effectiveness study. Section 3 discusses future directions for the role of cost and cost-effectiveness evaluations in the EPI as a whole. Additional discussion about cost-effectiveness methodology is found in Appendix C.

28. Scientific Advisory Group of Experts (SAGE). 9-11 June 1998. "What Actions Will Accelerate the Introduction of New Vaccines?" Geneva: Global Programme for Vaccines and Immunization, World Health Organization.
***Keywords*: New Vaccines**

A number of highly effective vaccines are available beyond the six originally recommended for wide use by WHO, but many countries do not use them in their national immunization programs. The CVI Task Force on Strategic Planning judges these to be 'underused' vaccines and recommends actions to bring them into appropriate wider use. It also recommends examination of the utility of other vaccines, such as typhoid in particular disease-endemic situations. Many deaths and much suffering and disability could be averted by earlier adoption of these, and other vaccines. It is therefore important to identify ways in which the process of new vaccines introduction can be accelerated. An appropriate balance needs to be achieved between extending coverage where it is already high, the launching and timing of eradication efforts, and adding new vaccines to the existing delivery system.

29. SmithKline Beecham. 27-29 April 1998. "First Asia-Pacific Regional Consultation on Economic and Policy Considerations for the Introduction and Use of New Vaccines." Chiang Mai, Thailand.
***Keywords*: New Vaccines, Public/Private Partnership, Financing**

All bodies involved in immunization programs must plan for the future. It is imperative that long-term planning for new vaccines is undertaken now, and that decision-making for the introduction of such vaccines is based on an informed understanding of disease epidemiology, and of the likely impact and benefit to be derived from the use of such vaccines. This consultation brought together leading experts and policy makers and as well representatives of international organizations and private industry and allowed for a broad-based assessment of the opportunities and concerns in Asia and the Pacific Rim in relation to new vaccine introduction and use. Issues addressed included concerns regarding information needs for rationalizing the decision-making process, promoting cooperation, and collaboration between public and private sectors, and financing the introduction of new vaccines in a manner which best meets the interests of the consumer.

30. Swartz, J. Brad and Loevinsohn, Benjamin. February 1999. "Sustaining Effective Social Programs: Financing Immunization in Cambodia, Lao PDR, and Vietnam."
***Keywords*: Sustainability, Financing, EPI**

Investment in human development is increasingly seen as an essential component of broad based economic growth. However, many aspects of human development require government financing or subsidies. This raises the thorny issue of how to ensure that effective human development activities are sustained in the medium term so that the investments made by governments and development partners can reap their returns. This monograph examines the financing of immunization, a social program that has been every effective in improving the health and well-being of children. It reviews the current and future financing of immunization programs in Cambodia, Lao PDR, and Viet Nam, assesses resource requirements over the next ten years, and suggests how these needs can be met. The ultimate goal is to ensure that the success of Expanded Program on Immunization (EPI) is sustained and that further impact

can be achieved by building on EPI's accomplishments. This monograph is also intended to assist the concerned governments and partner agencies in planning the future financing immunization programs by exploring alternative funding mechanisms.

31. Van Damme, Pierre and Beutels, P. 1996. "Economic Evaluation of Vaccination." ***PharmocoEconomics*** **9(Suppl.3): 8-15.**
Keywords**: Planning, Management, Cost-Benefit, Cost-Effectiveness**

With increasing expenditures in healthcare, interest in the efficiency of certain interventions in healthcare has also increased. Faced with the limitations of the healthcare budget, budget holders try to find the optimal way of dividing their funds over different healthcare provisions, without discarding human and medical considerations. One instrument that can help in making such choices and which is advocated in this paper is the economic evaluation. In economic evaluations of vaccinations, different vaccination strategies are defined. The consequences in terms of costs and effects of each strategy are being calculated and compared with a reference strategy, which is often the nonintervention strategy, i.e. 'no vaccination.' According to the way in which the benefit or the output of vaccination— 'improvement of health'—is measured, a distinction is made between various methods of economic evaluation: in a *cost-effectiveness analysis*, health gains are measured in natural units (e.g. prevented infections, prevented illness days, life-years gained, etc.); in a *cost-utility analysis*, the quality of the health gains is taken into account (e.g. *quality-adjusted life-year*); and in a *cost-benefit analysis*, health gains are converted into monetary units.

32. Van Damme, P., Kane, M., and Meheus, A. April 1997. "Integration of Hepatitis B Vaccine into National Immunization Programs." ***British Medical Journal*****: 314.**
Keywords**: Hep B, Costs, Developed Countries**

Hepatitis B is a major public health problem even though safe and effective vaccines have been available for over ten years. Because hepatitis B infection is largely asymptomatic with long term complications occurring after many years if has not received the attention it deserves. Strategies to immunize those at high risk have failed to control the disease. Delegates to the World Health Assembly of the World Health Organization recommended in May 1992 that all countries should integrate Hepatitis B vaccination into their national immunization programs by 1997. Some Western European countries remain unconvinced that the burden of disease warrants the expense of universal vaccination. However, epidemiological data and economic evaluation show that universal hepatitis B vaccination is cost effective in countries with low endemicity and that it will control hepatitis B, reinforcing the necessity for action.

33. The World Bank. February 1999. "Situation Analysis: Report on Findings of Immunization Working Group."
Keywords**: Financing**

In March of 1998, the President of the World Bank, James Wolfensohn, hosted a meeting entitled Vaccine Development and Delivery: Leadership for the 21st Century. Motivated by an increased recognition of the value of vaccines, these leaders called for the creation of a working group to prepare recommendations on how to revitalize global effort in immunization. This report calls for a coordinated effort which would look like a modified version of the global coalition, Children's Vaccine Initiative (CVI).

34. The World Bank. 1999. "Addressing Financing in a Coordinated Effort: Strategies to Finance the Purchase of Vaccines and Strengthen the Immunization Infrastructure." Working group of the Global Alliance for Vaccines and Immunization.
***Keywords*: Policy, Management, Financing**

This report discusses the various options for interventions to ensure that immunization programs worldwide are sustained and strengthened. These would include new funding mechanisms such as a Global Vaccine Fund, as well as advocacy activities.

35. World Health Organization. September 1998. "Expanded Programme on Immunization (EPI): The Social Science and Immunization Research Project." ***Weekly Epidemiological Record*** **73(37): 285-288.**
Keywords: **EPI, Management, Culture and Behavior**

The Social Science and Immunization Research Project is organized as a multinational activity with funding from the governments of Denmark and the Netherlands. This article is a summary of general recommendations which were formulated by researchers from the country teams, in collaboration with the representatives of international agencies and other partners. While the success in immunization achieved so far has been considerable, a social science perspective should provide valuable new insights into how the missing 20% or more can be reached. Social and behavioral research at community, national and international levels can provide a better understanding of what is needed to get more public support for immunization. The studies have shown that immunization coverage levels are the result of a complex interaction between demand and supply factors within specific sociocultural contexts and administrative and organization cultures. Of particular importance is the observation , valid in all the countries studied, that serious damage is being done to the programme by the poor interaction between staff and clients.

3.2 Costing

36. Brenzel, L. and Claquin, P. 1994. "Immunization Programs and their Costs." ***Social Science and Medicine*** **39(4): 527-536.**
Keywords: **Cost-Effectiveness, Sustainability, EPI**

The Expanded Program on Immunization (EPI) has made considerable progress in the 1980s towards immunizing the world's women and children. Vaccinations provided through the EPI are believed to be one of the most cost-effective child survival interventions at a cost between $5 and $10 per child. However, variation exists in the average cost per fully immunized child, depending upon the type of vaccine technology and delivery strategy utilized, the scale of operation, and country and environmental characteristics. Recent evidence on the cost-effectiveness of immunization strategies raise concerns over the affordability of national immunization programs by governments and highlights the need for continued donor support, identification of other financing mechanisms, or reconsideration of policies aimed toward accelerating and maintaining immunization coverage.

37. Bloom, B.S., Hillman, A., Fendrick, A. et al. 1993. "A Cost-effectiveness Analysis of Vaccination Strategies against Hepatitis B" ***Annals of Internal Medicine*** **118(4): 298-306.**
***Keywords*: Hep B, Costs, Economic Evaluation**

Which is the best vaccination strategy against Hepatitis B? Four populations have been determined: new-born infants, children under 10 years of age, high-risk adults, and the adult population of the United States. The objective of this study was to identify the clinical and economic arguments in favor of vaccination, with and without preliminary data tracking. The literature on estimations of the incidence, and on the effectiveness and side-effects of vaccination reflects that these issues are widely debated. The

authors carry out a quantifiable economic analysis upon which they make the following recommendations: systematic tracking of pregnant women, tracking of new-born infants following vaccination and complete vaccination of children prior to entering school.

38. Bovier, P.A., Wyss, K., and Au, H.J. 1999. "A cost-effectiveness analysis of vaccination strategies against N. meningitidis meningitis in sub-Saharan African countries." *Social Science and Medicine* 48(9): 1205-1220.
***Keywords*: Cost-Effectiveness**

This analysis evaluates the cost-effectiveness (C/E) of routine vaccination against *Neisseria meningitidis.* Three different preventive strategies are analyzed: mass vaccination during epidemics (the current standard of care), routine preventive vaccination and a combination strategy of routine vaccination with mass vaccination during epidemics. A Markov model is used to simulate the epidemics of meningitis in a cohort of 5-year old children and compare these different strategies. The results show that mass vaccination strategy is dominated by the two other strategies. The incremental C/E ratios are US$50/QALY for the routine vaccination, and US$199/QALY for the combination strategy. The C/E ratios are sensitive to: the incidence of meningococcal meningitis, the costs of treating cases, the costs of routine vaccination and the costs and effectiveness of mass immunization campaigns. However the rank ordering of the strategies is almost never altered. The results of this analysis suggest that mass vaccination in sub-Saharan Africa in case of epidemics should be reconsidered. Routine vaccination against meningococcal meningitis at an early age, with or without mass vaccination during epidemics is more effective with a C/E ratio within the range of other vaccination strategies currently in place in Africa.

39. Demicheli, V. and Jefferson, T. 1997. "An Exploratory Review of the Economics of Recombinant Vaccines Against Hepatitis B." In The Economic Aspects of Biotechnologies Related to Human Health Part 1: Biotechnology and Medical innovation: Socio-Economic Assessment of the Technology, the Potential, and the Products. Paris: Organization for Economic Co-operation and Development OECD/GD (97)205: 105-123.
Keywords: **Hep B, Literature Review, Costs, Cost-Benefit Analysis**

The objectives of the review were two-fold. The first objective was to identify, retrieve and analyze the available published and unpublished studies on the efficiency of the introduction of programs of yeast-derived vaccines against hepatitis B in developed countries. The second objective was to assess the variability of assumptions upon which such economic models are based and the conclusions reached in those countries. The review included 33 studies addressing issues such as evaluation of vaccinating high-risk populations, evaluation of screening before HB vaccination, evaluation of different routes of vaccination, and evaluation of combining vaccines in one shot. The review summarizes findings on the incidence of hepatitis B, cost estimates, vaccination costs, and results of cost-benefit analyses.

40. Feilden, R. 1996. "Costs and Effectiveness of Immunization Services in Moldova, Starting the Fieldwork." Arlington, VA: BASICS Project.
Keywords: **Costs, Cost-Effectiveness**

The objectives of the cost-effectiveness study address the following areas of concern: cost of vaccine, clinicians' practices, vaccine handling practices, safety of injections, and choice of strategies. This trip report provides information on the preparation of formats on collecting data, agreement on the final sample of rations, training the teams of epidemiologists and pediatricians who would be gathering the data, and the commencement of fieldwork. The author recommends providing a concise field guide along the lines of WHO's Immunization in Practice to specify acceptable vaccine handling practices, and linking these with appropriate strategies for providing the service.

41. Kerleau, M., Flori, Y., Nalpas, B, Lanoe, J. et al. 1995. "Analyse coût-avantage d'une politique de prévention vaccinale de l'hépatite virale B/Cost-Benefit analysis of anti-hepatitis B virus vaccination policy." *Revue de l'epidemiologie et de sante publique* 43(1): 48-60.
***Keywords*: Cost-Benefit**

At present in France, hepatitis B is spread primarily through heterosexual interaction. An effective vaccine is available on the market, however, the determination of a public health intervention policy must also take into account an assessment of costs involved in the expanding immunization activities and address evolving public health priorities.

42. Lieu, T., Finkler, L.J., Sorel, M.E. et al. 1995. "Analyse coût efficacité de la vaccination contre la varicelle chez les enfants d'âge scolaire et les adolescents: dépistage préalable contre vaccination systématique/Cost-effectiveness of varicella serotesting versus systematic vaccination of school-age children and adolescents." *Pediatrics* 95(5): 632-638.
***Keywords*: Cost-Benefit**

By carrying out this important analysis of the advisability of vaccinating children against chicken pox, the authors have devised a strategy comparing costs and benefits. Two decision trees are described: one for children from 6 to 12 years of age, and the other for children from 13 to 17 years of age. Three vaccine policies are also considered: no vaccination, preliminary tracking, and systematic vaccination. Probability calculations are made, taking into account current literature and expert opinion. The costs identified include short, average and long-term medical costs and lost working days. This study shows that this vaccination strategy is expensive, but still profitable if done for school-age children and if done in combination with other immunizations. The authors point out that the choice of strategy varies with the quality of the health system and its priorities. Additional empirical evidence must be taken into account in policy formation.

43. Percy, A., Brenzel, L., and Waty, M. April 1991. "Cost Recovery for Immunization: A Worldwide Survey of Experience." Arlington, VA:REACH Project, John Snow, Inc
***Keywords*: Financing, Cost Recovery, Country Experiences**

This document presents the results of a comprehensive survey of cost recovery mechanisms for EPI which are currently in place or which have been attempted recently in 103 countries. The survey includes 42 countries in Africa, 37 countries in Asia/Near East, and 24 countries in the Latin America/Caribbean region. Results of this survey show that a wide variety of cost recovery or alternative financing mechanisms have been tried in many developing countries to raise additional resources for the EPI or PHC. Initiatives in both the public and private sectors are described. The authors recommend that detailed assessments of the most promising mechanisms be undertaken so that these experiences can be shared with other developing countries facing difficulties in financing immunization programs.

3.3 Financing

44. Achat, H., McIntyre, P., and Burgess, M. 1999. "Health Care Incentives in Immunization." ***Australian and New Zealand Journal of Public Health* 23(3): 285-8.**
***Keywords*: Financial Incentives for Immunization, Immunization Uptake, Country Experience**

Australia has introduced a nationwide immunization incentive scheme. This two-year program offers financial rewards to providers and parents to encourage childhood immunizations. The objective of this study was to review the use of incentives in immunization uptake in various countries, to identify issues in developing an incentive program for childhood immunization, and to examine the findings within the

context of the Australian scheme. In Australia, the IMMUNISE AUSTRALIA Program comprises initiatives directed towards general practitioner's and parents. The General Practice Immunization Incentive scheme, introduced in 1998, offers cash incentives to general practitioners upon notification to the Australian Childhood Immunization Register and an Outcomes Bonus payment related to the percentage of children attending the practice who are fully immunized. Conclusions drawn from the analysis include that both monetary and non-monetary incentives can improve childhood immunization uptake, however effective incentives require collaboration of key players.

45. Batson, A. 1998. "Sustainable Introduction of Affordable New Vaccines: The Targeting Strategy." ***Vaccine*** **16 (Suppl): S93-98.**
Keywords**: Financing, Accessibility, Market Segmentation**

Assuring that the existing and new vaccines are available to all children in the world is a global health priority. Despite the clear health need and benefit, many countries have been unable to provide "new" vaccines to their populations. For these countries, the limitation has been the inability of governments to finance the vaccine because of a combination of factors including dependence on donors, donor policy, inadequate recognition by governments of the value of vaccines, and the absolute price of the vaccines. It is economics and not epidemiology which dictates introduction of the vaccine into national immunization programs. UNICEF and the WHO have developed and adopted a framework which differentiates countries based on their capacity to be financially self-sufficient for their vaccine needs. This framework forms the basis of strategies designed to co-ordinate the actions of governments, donors, agencies, and vaccine manufacturers in order to ensure all countries have rapid access to affordable vaccines. Indicators for the success of immunization programs include relative wealth of the population (GNP per capita), total market size (GNP) and total population. Countries are plotted on a graph by population and GNP per capita. The third dimension, countries sharing a similar GNP, is then overlaid to form a curve. Countries falling within each curve share common levels of wealth and infrastructure and have similar capacity to be financially self-sufficient.

46. Chunsuttiwat, S. 1999. "Thai EPI and Its Financing: Recent Experience." CVI Meeting on Sustainable Financing for Vaccination Program.
Keywords: **EPI, Country Experience**

Since the commencement of EPI in 1977, it has always ranked among the priority health programs in Thailand. Over the previous two decades, the program has been making continuous progress in several dimensions. It keeps adding new vaccines to the immunization schedule. Current immunization schedule offers 11 antigens including hepatitis B and Japanese encephalitis vaccines to preschool children. Immunization coverage has been steadily improving; the survey in 1996 revealed over 90% coverage for all childhood vaccines. Despite high average coverage rates, however, the program is currently concerned about and focusing its attention on the under-served and hard-to-reach groups whose immunization status is inferior. Child immunization in Thailand is administered mainly through public health service infrastructure; only 10% of immunizations are provided at private hospitals and clinics. However, the private sector immunization is steadily gaining popularity, especially in urban centers.

47. Fenn, P., Grey, A. and McGuire, A. 1996. "An Economic Evaluation of Universal Vaccination Against Hepatitis B Virus." ***Journal of Infection*** **32: 197-204.**
Keywords**: Hep B, Cost-Effectiveness, Developed Countries, Economic Evaluation**

This report presents the results of an economic evaluation utilizing U.K. data, into a vaccination program against hepatitis B using a genetically engineered, yeast-derived vaccine, *Energerix B.* Cost-effectiveness ratios were calculated for four different programs: an infant vaccination program; a child vaccination program; an adolescent vaccination program; and a combined child and adolescent program. For each

program, the number of annual cohorts vaccinated was varied from one to twenty-five. The outcome was defined as incremental life years gained, and the results are reported as costs per incremental life-year gained. Benefits were calculated in both undiscounted and discounted forms. All costs were discounted at a rate of 6%. All major epidemiological and cost assumptions were subjected to a sensitivity analysis. Baseline results with benefits discounted range from £188 015 to £ 301 365 per life year gained, depending on the duration of program and vaccination strategy. With benefits undiscounted, the comparable range is from £ 5234 to £ 13 034. 1990 PHLS data on reported infections were used. All costs have been converted to 1992/1993 prices using the Hospital and Community Health Services Pay and Price Index supplied by the Department of Health.

48. World Health Organization. 1998. "Financing of New Vaccines: What are Our Options?" Paper presented at the Scientific Advisory Group of Experts (SAGE), Geneva, 9-11 June 1998.
***Keywords:* Management, Financing, New Vaccines**

Around two million childhood deaths still occur annually as a result of vaccine-preventable diseases. The most important issue for resolving this looming crisis is the mobilization and allocation of new or additional resources which are required for the introduction of new vaccines. To overcome past difficulties in financing new vaccines, new strategies need to be introduced. First, a country-based approach is imperative. In order for sustainable vaccine financing to be successful, governments need to be responsible for their individual national immunization program both financially and technically. Second, while it must be stressed that the ideal would be for countries to finance their recurrent public vaccine costs through their own budgets, the reality is that many countries cannot do so or will have difficulty absorbing the cost of new vaccines. One option for remedying these costs is to use development loans. For infrastructure building, particularly regarding capital expenses, the use of loans can be quite beneficial. In addition, short-term or one-time purchases of vaccines can also be considered as an appropriate use of loan financing. Loans are best used as limited-term measures that enable countries to prioritize and expand their own budget lines for necessary vaccine purchases. They are poorly used if they serve as excuses to avoid this, or if they encourage countries to live beyond their means by supporting unsustainable purchases.

3.4 Policy

49. Bennett, Eddas. 1999. "Geographical Differences in Cost-effectiveness: Vitamin A Interventions in South Africa." Department of International Development, London School of Hygiene and Tropical Medicine.
***Keywords*: Cost-Effectiveness**

This report describes ongoing project work to examine geographical differences in cost-effectiveness through evaluating the cost-effectiveness of vitamin A supplements and food fortification in reducing mortality in children six to twenty-four months of age in South Africa. Five intervention strategies are considered: distribution of capsules to children linked to existing measles vaccine doses, extension of coverage of measles vaccine and Vitamin A to 80% of children, fortification of maize to provide 100% of RDA for children (produced by large mills), extension of strategy 3 to fortify maize milled by large and small millers, and combination of strategy 1 and strategy 3. The cost-effectiveness of these alternatives for preventing vitamin A deficiency is estimated for South Africa as a whole, in addition to the nine provinces, and the twenty-four health districts in the Western Cape province. District-level data on the health system and health status is used to examine factors likely to contribute to geographical differences in the cost-effectiveness of other health interventions.

50. Foster, S. 1998. "Sustaining and Improving Benefits of Immunization within Zambian Health Reform." September-October 1997. Government of Zambia, WHO, UNICEF, DANIDA, JICA, and USAID (BASICS).
Keywords: **Country Experience, Decentralization**

To improve availability, access, delivery, and quality of an identified package of essential health services, the Government of Zambia has decentralized planning, management, implementation, and evaluation of health services to the district level. Reform initiated in 1992 is now functioning in all districts. Based on past Zambian filed experience of the Team Leader and the Cold Chain Expert, major improvements in the availability, coverage, and quality of the essential services have been and are being achieved. A major strategy of Health Reform in Zambia involves shifting of resources including personnel from the Central Ministry of Health to the district level. Although this review was initially planned as a standard EPI review using WHO modules, the format was found to be inconsistent with government policy and was shifted to its current format. As Zambian policy focuses on integrated delivery of services, review format was broadened to delivery of immunization within the framework of preventive service delivery. The review examines vaccine supply, service delivery, communications, and health information systems.

51. Hausdorff, W.P. 1996. "Prospects for the Use of New Vaccines in Developing Countries: Cost is Not the Only Impediment." ***Vaccine*** **14(13): 1179-1186.**
Keywords: **Management, New Vaccines, Costs**

Global immunization programs represent a great public health success story. Evidence from every region documents substantial reductions in morbidity and mortality following widespread use of vaccines developed years ago. Development and introduction of new vaccines and vaccine combinations aimed at the industrialized world market are occurring at a fast pace. A number of political and economic factors will influence the rate at which developing country immunization programs incorporate those new vaccines that could have a major public health impact. Perhaps the greatest determinant of this rate is the extent to which international and bilateral agencies and national governments appreciate the potential value of new vaccines. UNICEF recently issued a new vaccine supply strategy, encouraging countries to become self-financing for vaccine purchases and targeting its funds towards the neediest countries with strong immunization programs. This article advocates for developing countries and donor agencies to look to CVI and WHO for guidance in determining the relative value of new vaccines and for CVI and others to articulate the value of new vaccines.

52. ICCDR/Bangladesh. 1998. "Summary of project: cost comparison and cost-effectiveness analysis of measles immunisation in Dhaka, Bangladesh." In ***Health Economics & Financing Programme: Research Portfolio*****. London: Health Policy Unit, London School of Hygiene & Tropical Medicine.**
Keywords**: EPI, Costs, Cost-Effectiveness, Country Experience**

The Expanded Programme on Immunization (EPI) in Bangladesh is focused on six diseases: tuberculosis, tetanus, diptheria, measles, whooping cough, and poliomyelitis. Of these childhood diseases, measles is the major cause of mortality. Each year an estimated one million children die from measles globally, despite the widespread availability of safe and effective vaccines since 1963. The improvement of the immunization coverage in Bangladesh is striking. Coverage increased from 10% in 1988 to 59% in 1993, and was 68% in urban areas such as Dhaka. The aim of the study is to assess the measles component of the EPI in Dhaka in terms of a cost comparison analysis, in which the treatment costs averted are subtracted from the cost of measles vaccination in order to calculate the net cost. The study also estimates the additional resources required to progress from measles-control to accelerated measles activities, and the associated gains in measles immunization coverage.

53. Jarrett, S. W. and Qi, X. Q. 1988. "Financing of Child Immunisation Services in China." ***Asia-Pacific Journal of Public Health*** **2(1).**
Keywords**: EPI Sustainability, Financing, Pre-payment, Country Experience**

China is accelerating its Expanded Programme on Immunization (EPI) to reach 85% of children under one year of age in each county by 1990, thereby protecting them against six preventable childhood diseases. With around 20 million births a year, this is a daunting task. This review looks at the financing of child immunization services in China, not in its totality but focusing on the primary care level. In most parts of China village doctors are responsible for carrying out immunization services in rural areas, where 80% of the population live. Different ways have been tried to pay village doctors for their work, with considerable variations at the local level. Two methods are beginning to create the conditions for long-term sustainability of services: 1) in poorer areas, county subsidies from the regular county health budget provide a regular monthly income for the village doctor; 2) in more economically-advanced areas, a pre-payment plan called the EPI contract, is enjoying considerable initial success in generating parental interest in child immunisation and funds for paying village doctors as well as contributing towards the maintenance of EPI operations.

54. Knippenberg, R., Soucat, A., Oyegbite, K., Sene, M., Broun, D., Pangu, K., Hopwood, I., Grandcourt, R., Tinguiri, K., Fall, I., Ammassari, S., and Alihonou, E. 1997. "Sustainability of Primary Health Care Including Expanded Program of Immunizations in Bamako Initiative Programs in West Africa: An Assessment of 5 Years Field Experience in Benin and Guinea." ***International Journal of Health Planning and Management*** **12 (Supp.1): S9-S28.**
Keywords: **Management, Sustainability**

Since 1986 Benin and Guinea have taken on the task of reorganizing their peripheral health systems. Their objective was to improve health systems performance despite their former decline due to inefficient management and economic crisis. This paper is an explanation of how, in these two countries, national programs revitalized the existing health center network in order to improve the effectiveness and efficiency of health services, while ensuring sustainability and establishing equity mechanisms.

55. Leighton, C. 1992. Country and International Donor Financing Strategies for Sustainability of the EPI in Africa: Experience from the USAID Health Financing and Sustainability Project. Bethesda, MD: Health Financing and Sustainability Project, Abt Associates Inc.
Keywords: **EPI, Sustainability, Financing**

Economic and budgetary constraints have forced consideration of the sustainability of the EPI in Africa. Recommendations by the World Health Organization for the addition of new and improved vaccines and specific targets for the eradication of polio, elimination of neonatal tetanus, and control of measles heighten sustainability issues. The purpose of this paper is to identify key problems related to the financial sustainability of EPI, suggest feasible strategies and options countries can consider to promote sustainability, and identify possible donor roles. It considers sustainability of the EPI in the context of new immunization strategies and the changing supply and price factors of the vaccine market. It also addresses these issues in the context of broader African economic conditions and efforts to reform financing of the health sector as a whole.

56. Levin, Ann, et al. 1999. *Case Study on Costs and Financing of Immunization Services in Bangladesh.* Special Initiatives Report 21. Bethesda, MD: Partnerships for Health Reform Project, Abt Associates Inc.
Keywords: **Costs, Decentralization, Financing**

This study estimates the current and future costs of the country's immunization program, including the additional costs of improvements to the program, both to assist Bangladesh in planning its program and to update and add to the available information on immunization costs of the global community. The Partnerships for Health Reform in collaboration with BASICS/Bangladesh and the Ministry of Health and Family Welfare (MOHFW) of Bangladesh, conducted an in-depth case study on the cost and financing of immunization services in Bangladesh. Cost and financing data for this analysis were obtained through government documents and in-depth interviews with key informants in the MOHFW, the donor community, non-governmental organizations, and international organizations.

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De Champeaux, A. and Kaddar, M. January-February 1991. "EPI National Review Report on the Cost of Fully Immunizing Children in Togo."
***Keywords*: Country Experience, EPI, Costs**

This study is on cost and financing of national immunization program in Togo in 1990. The national average coverage rate was estimated at 45%. A distinction is made between program EPI-specific costs (considering inputs such as vaccines, syringes, needles, supplies, social mobilization for National Immunization Days, transportation, cold chain equipment and maintenance) and total EPI costs. Current resources (e.g., personnel, building, overhead) represent 62% of total costs. The government of Togo was paying for most expenditures in the context of heavy external debt. The total cost per fully immunized child is around US$ 8. Financing issues are critical: the government covered only 2% of the additional costs, UNICEF 52%, and the rest was funded by different donors and international organizations (e.g., USAID, Rotary, WHO). The Togo case is an example of a centralized, vertical and ultimately, non-sustainable program with relatively good short-term performance due to significant external support.

58. Msambichaka, K. 1998. "Sustaining Immunization Efforts under Health Reforms: Challenges for Africa." CVI meeting. New York: UNICEF.
Keywords: **Sustainability, Country Experiences**

A number of African countries are implementing health reforms. The aim is to reorganize health services delivery systems to become cost-effective, efficient, affordable and sustainable. Immunization services are part of the cost-effective basic health care package identified by the health reforms. They are still not functioning well in most countries of Africa. They deserve special attention during the health reforms process to ensure that the services are improved and sustained. Experiences from Tanzania, Uganda, and Zambia are used to identify specific responsibilities of different players in order to ensure that high quality, effective immunization services are sustained in Africa.

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5.2 Internet Resources

ORGANIZATION	WWW ADDRESS DESCRIPTION
Allied Vaccine Group	Www.vaccine.org Allied Vaccine Group is a web ring created to facilitate access to reliable, science-based information about the economic and health benefits of vaccines and immunization. Along with links to member websites, the homepage of the web ring contains an engine that allows a simultaneous search of member sites for vaccine-related information. Current members of the web ring are: Bill and Melinda Gates Children's Vaccine Program at PATH; The International Vaccine Institute in Seoul, Korea; The National Network for Immunization Information and The Vaccine Page.
Centers for Disease Control, National Immunization Program	Http://www.cdc.gov/NIP/ Contains vaccine and disease information on Meningitis, Rotavirus, Autism, Childhood Diarrhea, Hepatitis B, and Thimerosal. Also maintains resources for health care professionals such as a course textbook on Epidemiology and Prevention of Vaccine-Preventable Diseases, health manuals on the Hepatitis B Vaccination Program, a manual on the Surveillance of Vaccine-Preventable Diseases, and the National Infant Immunization Week kit.
Children's Vaccine Initiative	Http://www.vaccines.ch This site contains a pertinent article by Julie Milstien, "Local Vaccine Production: Issues of Quality and Viability" (see http://www.vaccines.ch/vacsupl.htm for the specific site). The article focuses on the issue of locally-produced vaccines and suggests that local production is beneficial when sufficient support is received, but the potential disadvantages must be understood and addressed if this production is to be a significant and high quality source of vaccine supply.

ORGANIZATION	WWW ADDRESS DESCRIPTION
Children's Vaccine Program	Www.childrensvaccine.org The Children's Vaccine Program site provides a link to USAID's Development Experience Clearinghouse site (see http://www.dec.org/usaid_eval and titled, "Audience Research and Evaluation Methods (1996). This site provides the following "how to" research and evaluation documents: "Establishing Performance Targets," "Conducting a Participatory Evaluation," "Using Director Observation Techniques," "Conducting Key Informant Interviews," "Using Rapid Appraisal Methods," and "Conducting Focus Group Interviews." USAID SARA Project and Academy for Educational Development Http://www.childrensvaccine.org/html/ip_advocacy.htm "An Introduction to Advocacy—A Training Guide (1998)" This 130-page training manual provides tools to help people engage in the advocacy process. Though written specifically for an African audience, the guide can be used anywhere. This guide can be acquired through PDF downloads.
GAVI (Global Alliance for Vaccines and Immunization)	Http://www.vaccinealliance.org GAVI's Resource Center provides a list of links to vaccine-related organizations, publications and events. Of particular note is GAVI's information on the cost-effectiveness of immunizations in terms of improved public health and economic growth.
Immunization Action Coalition	Http://www.immunize.org/catg.d/free.htm Contains a list of free educational brochures for patients and health workers on vaccinations. For the patients, the brochures discuss the nature of some preventable diseases (such as chicken pox, Hepatitis A, Hepatitis B, and HBV infection) and the value of vaccinations. The brochures for the clinical staff range from how to improve your clinic's immunization rates to a sample letter explaining test results to a patient to vaccine handling, storage, and transport.

ORGANIZATION	WWW ADDRESS DESCRIPTION
The Immunization Gateway Vaccine Fact Finder	Http://www.immunofacts.com Provides a comprehensive link to up-to-date, expert immunization resources. This site is a jumping-off point for accurate vaccine and antibody information. The Immunization Gateway is an electronic service of ImmunoFacts™: Vaccines & Immunologic Drugs, a detailed, up-to-date reference book on immunologic drugs.
International Federation of Pharmaceutical Manufacturers Associations (IFPMA)	Http://www.ifpma.org The IFPMA represents the research-based pharmaceutical industry and other manufacturers of prescription medicines, worldwide. It is the main channel of communication between this sector of the industry and the World Health Organization as well as other international organizations that are concerned with health-related issues. The Federation also has a central role in the exchange of information within the international industry, and in the development of position statements on matters of policy.
International Vaccine Institute	Http://www.ivi.org The International Vaccine Institute was founded on the belief that health in developing countries can be dramatically improved by the development, introduction and use of new and improved vaccines and that these vaccines should be developed through a dynamic interaction among science, public health, and business. This site includes information on a study of the clinical, epidemiologic, and microbiologic features of bacterial meningitis and invasive bacterial infections in children less than five years of age cased by Haemophilus influenzae (Hi), Streptococcus pneumoniae (Sp) and Neisseria meningitidis (Nm).
Pan-American Health Organization	Http://www.paho.org Http://www.paho.org/english/hvp/hvp_vaccines.htm "Vaccine Technology Access" This page presents PAHO's strategies for increasing access to vaccines.

ORGANIZATION	WWW ADDRESS DESCRIPTION
Partnerships for Health Reform Project (PHR)	Http://www.phrproject.com Provides access to all published PHR Reports, including several on immunization financing. The site also includes a bibliographic database that cites books, papers, gray literature, videos, CD-ROMS, and journal articles related to health sector reform and the work of PHR. The database contains over 3,000 entries, primarily from 1990 to the present. The database can be searched by title, author, publisher, organization, date, country, region, and subject. To facilitate access to PHR constituents around the world, ordering information for documents is provided with each entry as much as possible.
Rotary International	Http://www.rotary.org This site contains links to RI's PolioPlus project and allows text searches of the RI Project Database for international immunization projects.
TECHNET (Technical Network for Logistics in Health)	Http://acithn.uq.edu.au/Vvm/index.html Provides a forum for professionals to discuss issues and ideas leading to concrete action for improved implementation, quality, and management of immunization programs. The forum encourages members to participate by providing contributions based on their own experience and expertise.
UNICEF	Http://unicef.org The UNICEF homepage contains a reliable search engine and links to publications and research. This site also contains the following reports on the "Progress of Nations" and contains numerous references to UNICEF's involvement in immunization programs:
USAID Child Survival	Www.info.usaid.gov/pop_health/cs/cshome.htm Provides an overview of USAID's Child Survival programs and provides links to publications on the various topics. The page includes a section on USAID immunization programs in developing countries.

ORGANIZATION	WWW ADDRESS DESCRIPTION
The Vaccine Page **(Vaccine News & Database)**	Http://www.vaccines.com Provides access to the latest news about vaccines and an annotated database of vaccine resources on the Internet. This site also has a listing of world vaccine sites by country.
World Bank	Http://www.worldbank.org/vaccines "Vaccines 2000" This page discusses the World Bank's immunization programs and provides information and links to partner organizations.
World Health Organization ***Note**: WHO's website is updated continuously—the links listed here are subject to change at any time.*	Http://www.who.int/vaccines Http://www.who.int/vaccines-access/Restructuring/Vaccines/Vaccine_Supply/Vaccine_Procurement/vaccine_proc.htm "Vaccine Self-sufficiency Through Procurement" This page discusses the Vaccine Independence Initiative's (VII) objectives of supporting countries as they take on increasing responsibility in their transition to self-sufficiency.
	Http://www.who.int/vaccines-documents/DocsPDF99/www9921.pdf Because many countries are unable to pay for new vaccines with their existing funding mechanisms, this site advocates a country-based approach to solving immunization financing problems; i.e., using development loans as a source of revenue for financing public vaccine costs.